

THE EFFECT OF KANGAROO MOTHER CARE ON NUTRITIONAL STATUS AND DURATION OF HOSPITALIZATION OF PREMATURE INFANTS IN IRAN

Simin Karimi¹, Parisa Parsa², Behnaz Basiri³, Godratalah Roshanaei⁴

¹ Students Research Committee, Hamadan University of Medical Sciences, Hamadan, Iran & Department of Midwifery, Medical Faculty, Arak Branch, Islamic Azad University, Arak, Iran.

² Chronic Diseases Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.

³ Department of Pediatrics, Faculty of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran.

⁴ Modeling of non communicable Diseases Research Center, Department of Biostatistics and Epidemiology, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran

Address for correspondence:
Dr. Parisa Parsa

Associate Professor
Chronic Diseases Research Center, Hamadan University of Medical Sciences, Iran
E-mail: pparsa2003@yahoo.com

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ABSTRACT

Objective: To find out the effect of Kangaroo Mother Care (KMC) on weight gain, breastfeeding and duration of hospitalization in premature infants.

Methodology: This was a quasi-experimental research. One hundred premature infants were selected by convenience method. They were randomly allocated to the experimental (50 infants) and the control (50 infants) groups. In the experimental group, the babies were provided minimum of one hour KMC position. In the control group, conventional care was given in incubator. The data collection tool was a questionnaire including demographic characteristics, frequency of breast-feeding, weight gain and length of hospital stay. Comparison of groups was carried out with independent t-test, chi-square test and ANOVA.

Results: There was no difference in weight between the two groups before intervention (control: 1789.80 vs. experimental: 1757.90, $P=0.660$). Repeated measurements ANOVA showed difference between mean weight of newborns over time in the two groups ($F=32.45$, $p < 0.001$). Hospital stay in the experimental group was shorter (control: 26.7 days vs. experimental: 14.3, $P < 0.001$). The frequency of breastfeeding in the experimental group was significantly more than in the control group (control: 5.04 vs. experimental: 13.32, $P < 0.001$).

Conclusion: KMC improves the neonatal weight gain, breastfeeding and decreases duration of hospitalization.

Key words: Breastfeeding, Kangaroo mother care, Hospitalization, Premature infants, Weight gain.

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INTRODUCTION

Preterm infant is defined as a baby born from the 20th week of pregnancy until completion of 37th week. Prematurity is associated with several problems, such as intra ventricular hemorrhage (IVH), respiratory distress syndrome (RDS), infections and apnea¹. Preterm delivery occurs in about 5-15% of pregnancies². Preterm

birth is the foremost cause of newborn morbidity and mortality worldwide, and interventions to prevent preterm birth are largely ineffective³. As compared to mortality rate of mature infants, the infant mortality rate of premature infants rises from 5 times in 37th week to approximately 45 times in the 32nd weeks of gestational age⁴. Developing countries face a high rate of premature infant mortality⁵.

On other hand, preterm delivery is associated with low birth weight (LBW) and delayed intrauterine growth^{6,7}. In spite of comprehensive efforts to prevent premature delivery and LBW infants, the birth rate of such infants is high³. Preterm birth is a source of extra burden on healthcare resources. Studies have reported that preterm or LBW babies are more likely to need hospital and community health services than those infants born at term or having normal birth weight^{8,9}. Therefore, reducing the need of hospitalization and medical costs for preterm and LBW babies is a goal for health services of developing countries.

Studies have shown that KMC has benefits for infants and mothers, including reduction in infant mortality rate, maintenance of the neonate's temperature and promoting breastfeeding¹⁰⁻¹⁵. KMC also improves the infant's respiratory rate, oxygen saturation, weight gain, sleeping condition and physical growth^{16,17}. It has a positive effect on physical growth and motor development of newborns¹⁸⁻²⁰. KMC decreases the neonates need for phototherapy and repeated admission for neonatal jaundice in LBW infants²¹. In addition, KMC has been shown to have a positive effect on mother and child attachment, infant's mental development and positive effects on the emotional atmosphere of the family²²⁻²⁴. Attachment between the neonate and mother leads to long-term benefits for families²⁵⁻²⁷. Also, babies who have KMC, have better physical growth after discharge from hospital²⁶.

Although, kangaroo mother care is an applicable, easy and effective method of care, some mothers do not agree to KMC because of fear and anxiety about keeping the baby and are uncertain about the benefits of this kind of care²⁸⁻³⁰. Therefore, in this study, the effect of KMC on the frequency of breastfeeding, weight gain, and the duration of stay in hospital were investigated in premature infants.

METHODOLOGY

This quasi-experimental study was conducted on a sample of 100 preterm infants who were admitted to the neonatal intensive care unit (NICU) in Fatemeh Hospital, Hamadan, Iran in 2016. They were randomly allocated into two groups; experimental (50 infants) and control (50 infants). Considering 95% confidence level, power of 90% and 10% of sample drop, the sample size obtained was 50 neonates in each group. Inclusion criteria were, birth weight less than 2500 grams, age of 32-36 weeks of gestation, lack of congenital anomalies or muscular dysfunction and infants not on phototherapy. Exclusion criteria were acute illness associated with KMC during the study and infants on mechanical ventilation or nasal continuous positive airway pressure (NCPAP). After obtaining permission letters, the researcher coordinated with the NICU staff, obtained informed consent

and briefed the parents of the infants on benefits and risks of KMC for their newborns and how to give KMC. In the experimental group, every baby was given daily KMC under supervision. After wearing a special KMC blanket, infant was placed in mothers' chest through the breasts with the help of nursing staff. Thus, skin to skin contact of baby and mother was created. Mother took her baby's body and neck with her hand. To maintain the temperature, the head of the baby was covered with a cap. Room temperature was set at 26-29°. Neonates received KMC for 4 hours in 4 sessions daily. In the control group, conventional care was provided in incubator. Data were collected with a questionnaire which included demographic characteristics and breastfeeding checklist. The neonates of both groups were weighed on the 1st, 3rd, 5th, 7th day of admission. Duration of hospitalization was recorded in days.

Using SPSS version 16, data were analyzed. Chi square test, Independent t-test and Repeated Measurements Analysis of Variance were used to compare the weight gain, frequency of breast feeding and duration of hospitalization in the two groups.

RESULTS

There was no significant difference between two groups with regards to parents' age, education level and occupation. Most of the mothers were in the age range of 21-30 years in the two groups. Majority of mothers were housewives. Most of the parents in both groups had completed secondary and tertiary education. Family income in the majority of the experimental group (62%) and control (66%) was between one to two million Tomans (equal to \$500) as shown in table 1.

Table 2 shows no significant difference between two groups of mean of breast feeding on day one. However, significant differences were observed between the two groups in terms of the frequency of breastfeeding on 3rd, 5th and 7th days. ($p < 0.001$).

Table 3 shows a significant difference between the two groups regarding the duration of hospitalization ($p < 0.001$). In the experimental group, the duration of infants' admission in hospital (14.3 ± 10.6 days) was lower than in the control group (26.7 ± 16.7 days).

Using the Repeated Measurements Analysis of Variance the changes of infants' weight on day 1, 3, 5, and 7 were examined. The effect of infant's caring method on weight gain was not significant ($p = 0.792$). However, the effect of time on neonatal weight gain was significant ($F = 35.18, P < 0.001$). Also, the interaction effect of care method on time was meaningful, which means that significant difference was found between the weights of newborns in two groups ($F = 32.45, p < 0.001$).

Table 1: Demographic characteristics of experimental and control groups

| Characteristics | | Experimental | | Control | | Statistics P |
|----------------------------|--------------|--------------|----|---------|-----|-----------------------|
| | | % | N | % | N | |
| Age of Mothers (year) | <20 | 4 | 8 | 2 | 4 | X ² =1.380 |
| | 21-30 | 31 | 62 | 36 | 72 | Df=2 |
| | >30 | 15 | 30 | 12 | 24 | P=0.510 |
| Age of Fathers (year) | 20-30 | 31 | 62 | 32 | 64 | X ² =0.261 |
| | 31-40 | 18 | 36 | 16 | 32 | Df=2 |
| | >40 | 1 | 2 | 2 | 4 | P=0.898 |
| Mothers' Education Level | Elementary | 1 | 2 | 6 | 12 | X ² =4.245 |
| | Secondary | 17 | 34 | 17 | 34 | Df=2 |
| | Tertiary | 32 | 64 | 27 | 54 | P=0.440 |
| Fathers' Education Level | Elementary | 0 | 0 | 1 | 2 | X ² =2.701 |
| | Secondary | 8 | 16 | 10 | 20 | Df=2 |
| | Tertiary | 42 | 84 | 39 | 78 | P=0.438 |
| Mothers' Occupation Status | Employed | 2 | 4 | 1 | 2 | X ² =0.341 |
| | Unemployed | 48 | 96 | 49 | 98 | Df=1 |
| | (housewives) | | | | | P=0.840 |
| Fathers' Occupation Status | Employed | 49 | 98 | 50 | 100 | X ² =0.261 |
| | Unemployed | 1 | 2 | 0 | 0 | Df=1 |
| | | | | | | P=0.710 |
| Family income (\$) | <500 | 31 | 62 | 33 | 66 | X ² =3.801 |
| | >500 | 19 | 38 | 14 | 28 | Df=1 |
| | | | | | | P=0.158 |

Table 2: Comparison of breastfeeding duration in two groups

| Breastfeeding duration | Experimental | Control | t | P |
|------------------------|--------------|-----------|--------|--------|
| | Mean± SD | Mean± SD | | |
| Day 1 | 4.40±1.21 | 4.38±1.78 | 1.558 | 0.821 |
| Day 3 | 8.66±1.36 | 4.78±1.60 | 13.013 | <0.001 |
| Day 5 | 10.92±1.30 | 4.92±1.56 | 20.826 | <0.001 |
| Day 7 | 13.32±1.31 | 5.04±1.69 | 27.335 | <0.001 |

Table 3: Comparison of duration of hospitalization in two groups

| Hospitalization | Experimental | Control | t | P |
|-----------------|--------------|-------------|-------|--------|
| | Mean± SD | Mean± SD | | |
| Duration (days) | 14.31± 10.62 | 26.72±16.31 | 4.005 | <0.001 |

DISCUSSION

The findings showed that KMC was associated with increased breast feeding and shorter hospitalization time in preterm newborns. Also, there was a significant difference between mean weights of newborns over time in the two groups. The duration of hospitalization

in the experimental group was shorter than that of the control group. Study conducted in infants with neonatal jaundice in Egypt found that the babies who received KMC recovered earlier from jaundice and needed a shorter duration of phototherapy than the control group (68.14 ± 24.32 hours versus 100.86 ± 42.26 hours, p = 0.004)²¹. In a study done by Jafari et al. in Mashhad,

Table 3: Comparison of weight gain of two groups on days 1,3,5,7

| Change source | Sum of squares | df | Mean of Sum of squares | F | P |
|--------------------------------|----------------|---------|------------------------|--------|--------|
| Between groups (Care Methods) | 46561.250 | 1 | 46561.250 | 0.700 | 0.792 |
| Within groups (Time) | 361070.300 | 2.03 | 177136.072 | 35.181 | <0.001 |
| Interaction Time* Care Method | 333054.500 | 2.03 | 163391.910 | 32.452 | <0.001 |
| Errors | 1005785.200 | 199.761 | 5034.941 | | |

Iran, Kangaroo's care had beneficial effects on length of hospitalization in premature infants which is consistent with our findings. The mean of hospital stay in the kangaroo care group was 7.9 days and in the control group was 10.6 days³¹. In a recent systematic review and meta-analysis conducted by Jafari et al., the effect of KMC on hospital management indicators (HMI) compared with the conventional neonatal care (CNC) It was found that the overall length of stay (LOS) was different between the two groups (KMC vs. CNC). The overall re admission to hospital was also different between groups. The overall parent satisfaction difference between the groups was 5.3%. The study recommended that beneficial effect of KMC on health status of the newborns and parents implies that KMC may be implemented in low and middle-income countries³². The effect of time on neonatal weight gain was significant in the two groups ($P < 0.001$). Ghavane et al. in 2012 found that average weight gain and breastfeeding rate in both groups was equal³³.

The positive effects of KMC on neonatal weight gain was reported by other studies. Basiri et al. Investigated the effect of the duration of the KMC on the growth of low birth weight infants. Weight gain in group with 4 hours per day of receiving KMC was 15 g/ day and in the group with less than 4 hours per day, it was 4 g/day ($P = 0.015$)¹⁶. Rangey and Sheth (2014) compared the effectiveness of Massage Therapy (MT) and KMC in low birth weight preterm (LBWPT) infants. Results showed both interventions were equal in improving body weight³⁴. Kumbhojkar et al., observed similar results in western Maharashtra, India. KMC babies developmental parameters improved significantly²⁰. In another study in India, Ali et al. found that KMC group had better outcome³⁵. The difference between the results of current study with other studies may be due to difference between infants' weight, age, duration of KMC and duration of follow up in their studies.

In current study, frequency of infants' breastfeeding was more in KMC group compared to control group ($P < 0.01$). Similarly, Safarabadi Farahani et al. showed that KMC increased the success of lactation in primiparous mothers ($P < 0.001$). But in their study the duration of exclusive breastfeeding did not reach to the fourth month after birth³⁶. Flacking et al. investigated

association between KMC with breastfeeding at 1 to 6 months of corrected age in mothers of very preterm (VPT) and preterm infants. VPT who were breastfed in KMC developed more rapidly than those with no kmc³⁷. In present study, the duration of exclusive breastfeeding was not investigated. Other studies showed positive effects of KMC on exclusive breast feeding and neurodevelopmental outcome of premature and LBW infants. Heidarzadeh et al. noticed the beneficial effects of KMC in NICU in Iran. In KMC group, exclusive breast feeding was more than CMC group³⁸. Vahidi compared the financial aspect of KMC and other care in LBW babies and found significant difference on economic implications of the two methods, KMC being least costly³⁹. Dod-dabasappa et al. followed babies for a year and found that KMC had a positive effect on the neurodevelopmental outcome of LBW babies⁴⁰.

LIMITATIONS

The limitations of our study include convenience sampling, lack of long term monitoring, and the discharge of some newborns before the completion of the study.

CONCLUSION

KMC is effective in reducing the duration of hospitalization, improving weight gain and increasing the frequency of breastfeeding in preterm infants.

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CONTRIBUTORS

KS conceived the idea and made initial manuscript. PP made layout of the project, helped in literature search, refining of the draft and statistical analysis. BB and RG helped in data collection, critical appraisal of the draft and bibliography. All author contributed significantly to the submitted manuscript.